$$\cos(x)\cos(y) = \frac{1}{2}[\cos(x-y) + \cos(x+y)]$$

$$\sin(x)\sin(y) = \frac{1}{2}[\cos(x-y) - \cos(x+y)]$$

$$\sin(x)\cos(y) = \frac{1}{2}[\sin(x-y) + \sin(x+y)]$$

$$\cos(x+y) = \cos(x)\cos(y) - \sin(x)\sin(y)$$

$$\sin(x+y) = \sin(x)\cos(y) + \cos(x)\sin(y)$$

$$\frac{d}{dx}[\tan^{-1}(x)] = \frac{1}{1+x^2}$$

$$\int u\,dv = uv - \int v\,du$$

$$\int x^n \sin(x)\,dx = -x^n \cos(x) + n\int x^{n-1}\cos(x)\,dx$$

$$\int x^n \cos(x)\,dx = x^n \sin(x) - n\int x^{n-1}\sin(x)\,dx$$

$$\int x^n e^{ax}\,dx = \frac{e^{ax}}{a^{n+1}}[(ax)^n - n(ax)^{n-1} + n(n-1)(ax)^{n-2} + \ldots + (-1)^{n-1}n!(ax) + (-1)^n n!],\ n \geq 0$$

$$\int e^{ax}\sin(bx)\,dx = \frac{e^{ax}}{a^2+b^2}[a\sin(bx) - b\cos(bx)]$$

$$\int e^{ax}\cos(bx)\,dx = \frac{e^{ax}}{a^2+b^2}[a\cos(bx) + b\sin(bx)]$$

$$\int \frac{dx}{a^2+(bx)^2} = \frac{1}{ab}\tan^{-1}\left(\frac{bx}{a}\right)$$

$$\int \frac{dx}{(x^2 \pm a^2)^{\frac{1}{2}}} = \ln\left|x + (x^2 \pm a^2)^{\frac{1}{2}}\right|$$

$$\int_0^\infty \frac{\sin(mx)}{x}\,dx = \left\{\begin{array}{ll} \pi/2, & m>0 \\ 0, & m=0 \\ -\pi/2, & m<0 \end{array}\right\} = \frac{\pi}{2}\mathrm{sgn}(m)$$

$$|Z|^2 = ZZ^*$$

$$\sum_{n=0}^{N-1} r^n = \begin{cases} \dfrac{1-r^N}{1-r}, & r \neq 1 \\ N, & r = 1 \end{cases}$$

$$\sum_{n=0}^{\infty} r^n = \frac{1}{1-r},\quad |r|<1$$

$$\sum_{n=k}^{\infty} r^n = \frac{r^k}{1-r},\quad |r|<1$$

$$\sum_{n=0}^{\infty} nr^n = \frac{r}{(1-r)^2},\quad |r|<1$$